



INTERVIEW SPOTLIGHT



■ **AVRILYNN DING**  
Bachelor of Health Sciences  
(Honours) Program, Class of 2017

■ **MAYLYNN DING**  
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# dr.stephen walter

## BEYOND DISCIPLINARY BOUNDARIES

■ **DR. STEPHEN WALTER** is a Professor Emeritus in the Department of Clinical Epidemiology and Biostatistics at McMaster University. He is also an Associate Member of the Department of Mathematics and Statistics. Dr. Walter has developed an international reputation for creating and applying statistical methods in biomedical research, particularly for the evaluation of diagnostic tests. His past positions include Chair of the International Clinical Epidemiology Network, Editor of the American Journal of Epidemiology, and Section Editor for the Wiley Encyclopedia of Biostatistics. Most recently, Dr. Walter was inducted as a Fellow into The Royal Society of Canada.

### ■ HOW DID YOU BECOME INTERESTED IN BIOSTATISTICS, AND IN PARTICULAR, LATENT CLASS MODELS?

I started off as an undergraduate in mathematics, which can be a very theoretical discipline. While studying in London, I became interested in applying mathematics. I ended up going to Edinburgh to work on my Ph.D. in an unusual arrangement at the time. I was jointly supervised by the professor of statistics and the professor of radiology. For my Ph.D. project, I did some work on the reliability and accuracy of reading X-rays. Fairly early on, I recognized that although sometimes physicians would claim that a diagnosis is completely accurate, that's usually not the case. Errors, in fact, happen for all sorts of reasons and that's what led me to latent class modelling. If you're not familiar, the latent class model does not assume any of the observations you make on a patient are completely accurate. You can use triangulation between all of



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the data points on the patient to assess the accuracy of the method and come out with a probability of who has the condition and who doesn't.

The goal of latent class analysis is to provide a good estimate of diagnostic accuracy. You can get a handle on the false positive and negative rates of a test, and determine its overall accuracy. I've worked for several years now on the evaluation of cancer screening programs where there are critical issues about false negative and positive readings. With latent class analysis, we can look at the trade-off between correct and false results in both directions.

■ HOW DID YOU DECIDE TO GET INVOLVED IN INTERNATIONAL RESEARCH? DID IT BRING ANY NEW CHALLENGES?

When I was young, my parents would take us on holidays to continental Europe, which at that time was a big deal. After I completed my undergraduate degree, I had a life-changing experience as a member of an overland expedition from several British universities to India. We drove across through Turkey and Iran, Afghanistan, Pakistan, and more. We spent about a month in India visiting various other sister universities. The whole trip

was about five months. It really opened my eyes as to what was going on in some other countries.

During the time I've been at McMaster we've had a number of initiatives. Notably there was an organization called INCLIN (International Clinical Epidemiology Network). We worked in about 25 developing countries to select medical schools and develop their research capacity by bringing people to McMaster for training. The trainees' responsibility was to develop research programs to implement back home. Conducting follow-up visits allowed me to continue my travel addiction. I travelled to India, South America, and parts of Africa on many occasions. Of course, that exposed me to a wide variety of cultures and how we, in more privileged parts of the world, can help. Sometimes it was a fantastic success and everything took root; other times we got snared in politics and difficulties in the local environment.

■ YOU WERE PART OF A TEAM THAT RESEARCHED THE EFFECTS OF INFLUENZA VACCINATIONS OF CHILDREN ON INFECTION RATES IN RURAL HUTTERITE COMMUNITIES. WHY DID YOU CHOOSE HUTTERITE COMMUNITIES IN PARTICULAR?

The particular project was led by Dr. Mark Loeb, who is a medicine professor here [at McMaster University]. The notion was that the Hutterites live in relatively small, isolated communities. Because of the logistics of that particular study where we randomized people to either receive the active flu vaccine or not, we had to do it one community at a time. In other words, we couldn't randomize easily at the individual level. Additionally, we felt there was an advantage to either vaccinating, or using as a control an entire community. We were looking at herd immunity effects in addition to individual outcomes. The Hutterite communities were ideal from the objectives of the research in that they were "smallish", with typically 100-150 people, and relatively isolated. There was not a great deal of contamination in those communities by other people or between communities. We hoped that if the vaccine had an interventional effect, it would be seen in the Hutterite communities. It would have been much more difficult to see the effect in larger communities, such as the one we live in now.

■ IN THE PAST, YOU HAVE SPOKEN HIGHLY OF MCMASTER'S INTERDISCIPLINARY APPROACH. COULD YOU PROVIDE AN EXAMPLE OF HOW SUCH AN APPROACH HAS IMPACTED YOUR RESEARCH?

Well, there are so many examples! My department, and health sciences in general, has fairly weak disciplinary boundaries. I was frequently involved in clinical studies primarily as a statistician, while being fully accepted as a co-investigator. That might have been quite difficult

in other institutions where there are much more rigid departmental and disciplinary boundaries. For example, we did a large study of melanoma that led to important findings about the effects of sunbeds and tanning, which quite recently led to legislation around the world against young people using commercial tanning facilities. Our study was actually the largest one used by the World Health Organization as part of its evidence base for its recommendation to countries to adopt the legislation. Again, I'm very proud of that and that's something that probably wouldn't have happened in many other institutions because a lot of different skills were required: clinical contacts, clinical expertise, design, analysis, logistics. All of those things had to come together in the right way.



**“WHEN YOU’RE ON A COLLABORATIVE TEAM, THE STATISTICIAN IS THE PERSON IN THE BACKROOM WORKING ON THE NUTS AND BOLTS OF THE STUDY... THE PROPER DESIGN AND ANALYSIS OF THE STUDY IS ABSOLUTELY CENTRAL TO THE PROJECT’S SUCCESS”**

■ **WHAT ADVICE CAN YOU GIVE TO UNDERGRADUATE STUDENTS WHO MAY BE INTERESTED IN PURSUING THE SAME LINE OF WORK?**

I would have to say that at the undergraduate level, it's probably quite difficult to know what it's going to be like as a graduate student. So my advice, I suppose, is to keep your options open. Obviously focus on the things that you like doing—the subjects you like doing—because it's got to be fun. Otherwise it's a waste of your time. Fun is a big component of research work, I think. If you're having fun, it all goes much better. Don't be afraid to ask “silly” questions. Students come to me all the time and they will say, “I've got a quick question”, or a “silly question”, or a “stupid question”. I always say to them, “there's never a silly question”. The answer may be silly, but you'll have to judge that.

■ **IF YOU HAD THE CHANCE TO GIVE ADVICE TO YOUR UNDERGRADUATE SELF, WHAT WOULD IT BE?**

I've had a habit, which I was informed about by David Sackett; he was actually the first Chair of our department in clinical epidemiology and biostatistics. He is a man I respect enormously. One thing I do remember him saying was, you need to take a day a week for yourself. Shut yourself away somewhere, it can be at home, it could be in your office but just close the door. But don't answer the phone, don't answer any letters, don't do

anything like that. Just focus on what really seems to be of interest to you at the moment. It could be something new, a new idea. Take that time to read that paper that you've had on your desk for a couple weeks. So if you do that, if you do that religiously, take even one day a week as a minimum, it can be enormously productive. It's a stimulus and a catalyst to whatever else happens during the week. So I think that would be the one gem I would like to pass on from David Sackett.

■ **WHAT DO YOU CONSIDER TO BE YOUR GREATEST ACHIEVEMENT SO FAR?**

I'm very pleased that some of the methods we've developed have been put into use by people around the world. I feel like that's a contribution to absolute knowledge. Good, solid method is something that everyone can pick up and its properties are indisputable. That's a little different from the results of any particular study in biomedical research, where there's always room for interpretation. I'm also very proud to have been a co-investigator with colleagues in a number of clinical areas. I mentioned surgery before, where doing randomized trials was almost unheard of a few years ago. I've also been involved with things like vaccine studies and studies with colleagues in intensive care. All of those research studies had a very big impact in the clinical community.

■ **THIS YEAR, YOU ARE ONE OF FOUR FACULTY MEMBERS FROM MCMASTER UNIVERSITY TO BE ELECTED TO THE ROYAL SOCIETY OF CANADA. WHAT DID IT MEAN TO YOU TO RECEIVE THIS RECOGNITION?**

It was a big surprise, first of all. To be quite honest, I don't really know what it means yet because the formal induction ceremony isn't until next month. But it was particularly touching this year because as I looked at the nominees from around the country, I believe I'm the only statistician. There are usually one or two. This is gratifying because often when you're on a collaborative team, the statistician is the person in the backroom working on the nuts and bolts of the study. It's usually the lead clinician you'll see in front of the press cameras when the study is announced. So I think that for me is rewarding. It's a recognition of biostatistics, which many people don't realize runs through a very high percentage of biomedical research studies. It is often absolutely crucial; the proper design and analysis of the study is absolutely central to the project's success. Without it, [the project] just wouldn't mean very much. There often isn't a very strong correlation between that and the way it is perceived by the public later on. ■

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